Motionography: Using Content Analysis to Refine the Creation and Study of Linear, Non-Interactive Motion Graphics

by

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Fall 2013

Abstract

The principles and practices of graphic design, animation, and information graphics have been studied and refined by a number of scholars and experts. But as digital media technology have evolved and improved, it has become possible to blend these three disciplines into a single one known as “motion graphics.” While motion graphics have existed for years in the form of hand-drawn and computer-generated animated sequences used on television and in movies - in the form of visual explanations, title sequences, compositing, rotoscoping, etc. - the use of motion graphics as a medium for storytelling, advertising/marketing, and social advocacy is a relatively new discipline. This study proposes to analyze the content of 50 motion graphics to determine the visual styles and production techniques that were used by the producers to create them. The goal of this study is to determine what kinds of techniques are used to emphasize importance, show causal relationships, advance a narrative, or simply present information.

Introduction

This study proposes to examine the production techniques and styles used in the creation of linear, non-interactive motion graphics.

Motion graphics are becoming more and more prevalent in consumer media and are being used for a number of communication purposes. They can be used to inform in a journalistic or historical manner, such as Hans Rosling's *200 Countries, 200 Years, 4 Minutes* (http://www.gapminder.org/videos/200-years-that-changed-the-world-bbc/), to advocate social policy, such as The Girl Effect's *Why Girls* motion graphics (http://www.girleffect.org/why-girls/#&panel1-1), to advocate for public policy, such as the Capstrat agency's Let's Talk Cost campaign (https://www.capstrat.com/work/lets-talk-cost-3/) about the Patient Protection and Affordable Care Act (commonly known as "Obamacare"), to teach, such as Philip Dettmer's Mechanisms of Evolution (http://philippdettmer.com/en/projekte/evolution-video), or to sell products in television and internet commercials, such as the McKinney agency's *Colors in Motion* campaign for the Sherwin-Williams paint company (http://mckinney.com/work/clients/sherwin-williams/colors-in-motion).

This mixed methods study would examine a series of 50 motion graphics that are collected as a supplement to the reference book *Informotion* (Fichtel, Finke, and Manger 2012) and from other sources related to journalism, business, education, and social advocacy. As digital media technology improves and becomes more integrated into society, motion graphics will become even more prevalent. Therefore, Fichtel, Finke, and Manger argue, motion graphic designers "must be aware of the associated advantages and disadvantages: which design options contribute to a targeted communication of information and which detract from it." (23)

I would gather both qualitative and quantitative data about the motion graphics in my sample

using a few different research methods. In the qualitative realm, I would first analyze the content of the motion graphics and code them using a coding framework called *Motionography* that I have designed for the purposes of this study and that is based off of the work of previous scholars and experts in the fields of motion graphics, data visualization, and graphic design. The *Motionography* codesheet will also take cues from *Videostyle* (Johnston and Kaid 2001), Fichtel, Finke, and Manger, and *Effect of Ornamentation on the Emotional Response and Perception of Motion Graphics* (Musselman 2013). As a supplement to the content analysis portion of the study, I would also conduct interviews with the producers of the motion graphics in the sample. I would ask them questions about their background, education, intentions or motivations behind the motion graphic they helped create, and other topics.

I would also draw a sample of 15 undergraduate students to look at some of these motion graphics and use Eye-Tracking technology to record where their eyes look through the duration of each motion graphic in order to better understand what parts of the motion graphic are being focused on.

Through this research, I hope to determine how some of the production techniques used by the producers of the motion graphics attract attention to certain elements and what artistic or design techniques are used to attract that attention. This study will help increase understanding about how effective motion graphics are created and what techniques are more effective than others at capturing a viewer's attention. This knowledge gained from this study could be applied to the design of motion graphics for a number of purposes including advertising and marketing, social or political advocacy, or education. This study will also help to clarify what elements in motion graphics are superfluous and unnecessary — what Musselman calls 'ornamentation' in his 2013 thesis and comparable to what Edward Tufte labels as 'chartjunk' in his definitive work

The Visual Display of Quantitative Information (1983) — in order to further refine the practice of targeting clear and concise information delivery through the design of motion graphics.

Literature Review_

The world is overflowing with information.

In a 2012 article for Forbes.com, Albert Pimentel, chief marketing officer for data storage hardware-maker Seagate, estimated that in 2012 the "total amount of digital information in the world will come to 2.7 zettabytes - that's 2.7 followed by 21 zeros … a 48 percent increase from 2011."

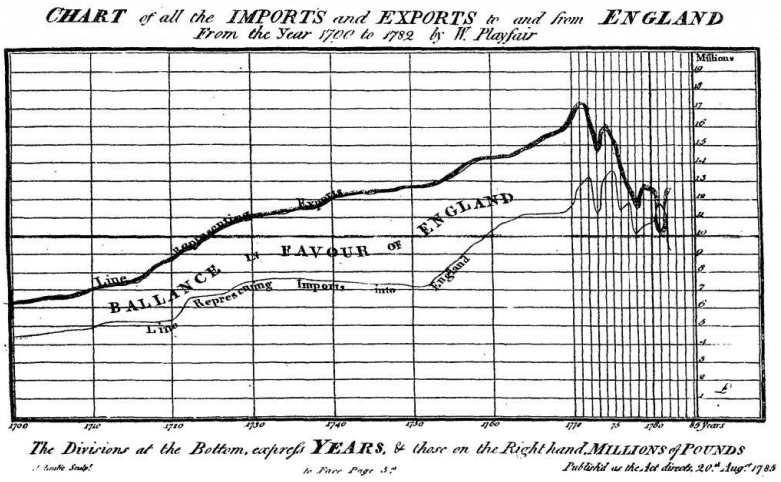
With the rise and increasing prominence of the Internet and portable digital media technologies come increasing opportunities to present and consume this tidal wave of information. This information often comes in the form of animated images that are used to present a number of different facts, narratives, or relationships in sequence or at once. But how should animated information - both of the smaller and the "Big Data" variety - be presented to viewers to maximize comprehension and retention?

According to data visualization pioneer Edward Tufte, data graphics — also known as information graphics, infographics, or, simply, graphics — have been used to display information in order for a viewer to more easily understand the subject matter since the second half of the 1700s. In *The Visual Display of Quantitative Information*, Tufte cites the work of who he refers to as the two great inventors of modern graphical design: Swiss-German scientist and mathematician J.H. Lambert (1728-1777) and Scottish economist William Playfair (1759-1823).

The Commercial and Political Atlas (Playfair 1786) featured the first-ever time series graphic created using economic data in a chart showing all of the imports and exports to and from England from 1780-82. The book also included the first known publication of a bar chart, which

showed import and export data for Scotland from 1780-81.

According to Tufte, Playfair preferred graphics over tables of data because the shape of the data was important to show so the viewer could compare different points of the data within the graphic easily.

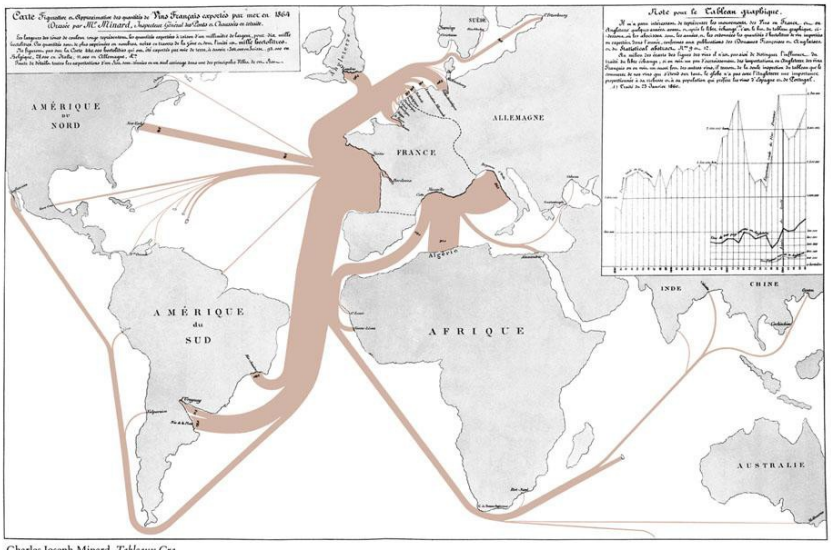


Other early creators of data graphics demonstrated how a simple, visual display of information can not only inform, but also serve a public good through proper presentation of quantitative data. Tufte (24) points out how a data map created by Dr. John Snow that plotted the locations of deaths of the waterborne disease cholera in central London, England, for the month of September 1854, "Deaths were marked by dots and, in addition, the area's eleven water pumps were located by crosses. Examining the scatter over the surface of the map, Snow observed that cholera occurred almost entirely among those who lived near (and drank from) the Broad Street water pump. He had the handle of the contaminated water pump removed, ending the neighborhood epidemic which had taken more than 500 lives." Tufte continues by describing how Snow's work can show the benefit of easy to understand visual presentations of information, "... the link between the pump and the disease might have been revealed by computation and analysis without graphics, with some good luck and hard work. But, here at least, graphical analysis testifies about the data far more efficiently than calculation." Tufte also cites the work of Charles Joseph Minard, whose 1864 world map data graphic, *Carte figurative et approximative des quantités de vin français exportés par mer en 1864* (Rough translation: "A Map Showing

French Wine Exports Via the Sea in 1864”), showed not only the quantities, but also the direction of movement in its portrayal of French wine exports to the rest of the world in 1864. It is worth noting that Minard’s wine graphic also demonstrates how data graphics can show differing levels of interconnectedness between categories of information through its portrayal of the export routes and the either strong or weak link between countries they demonstrate through the width of the line.

The work of these early pioneers of data graphics led Tufte to define the intent and characteristics of effective data graphic design. Tufte defines a data graphic as something that “visually display(s) measured quantities by means of the combined use of points, lines, a coordinate system, numbers, symbols, words, shading, and color.”

Through Tufte’s work, we know that “often the most effective way to describe, explore, and summarize a set of numbers



Charles Joseph Minard, *Tableaux Graphiques et Cartes Figuratives de M. Minard*, 1845–1869, a portfolio of his work held by the Bibliothèque de l’École Nationale des Ponts et Chaussées, Paris.

- even a very large set - is to look at pictures of those numbers." (9) Of course, merely displaying visual representations of numbers is insufficient. In addition to his definition, Tufte also described nine best practices for the creation and display of graphics: effective graphics should:

1. Show the data.
2. Induce the viewer to think about the substance rather than about methodology, graphic design, the technology of graphic production, or something else.
3. Avoid distorting what the data have to say.
4. Present many numbers in a small space.
5. Make large data sets coherent.
6. Encourage the eye to compare different pieces of data.
7. Reveal the data at several levels of detail, from a broad overview to the fine structure.
8. Serve a reasonably clear purpose: description, exploration, tabulation, or decoration.
9. Be closely integrated with the statistical and verbal descriptions of a data set. (1983)

Graphics that satisfy the nine criteria can accomplish much more than just act as a more complicated substitute for a statistical table of data. "At their best," Tufte, says, "graphics are instruments for reasoning about quantitative information." (9) Through the visual medium, graphics can show much more than the numbers in a data set. They can show visual patterns that may only be recognizable to a trained eye looking just at the data and as a result make that data more accessible and understandable to laypersons. They can also tell stories about the data.

Through their visual portrayal of the data, graphics tell a story. As Tufte says, "graphics *reveal* data." (13)

With the sheer amount of data we are surrounded by, it is no wonder that infographics have become more and more prevalent. In his compilation *The Best American Infographics*, Pulitzer-prize winning journalist Gareth Cook says consumers now find themselves in what he describes as the "golden age of infographics." (ix) "They appear in newspapers and blog posts, on television and in advertisements, in political campaigns and at art openings," Cook writes. "Most Americans would be hard-pressed to spend a day without seeing some kind of infographic." (ix)

Cook gives three reasons for the prevalence of infographics, all of which are related to technology. First, data is available for download in vast quantities and, covering virtually every imaginable subject; second, software has made it easy for amateurs to make infographics and provides experts with much improved tools; third, the Internet, combined with mobile computing, has made these infographics sharable. (ix) Cook's first reason echoes Pimentel's estimation about the sheer amount of information in the world. His second reason refers to the evolution and and increased penetration of graphic design software such as Adobe Photoshop and Adobe Illustrator, which have made the creation of graphics more accessible to a mass audience. It is important to note that because of this increased accessibility, there has been what could be called a democratization in the process of creating graphics. Even those with minor research or journalistic skills can still produce visually appealing rudimentary graphics with ease using modern design software. Cook's third reason for the prevalence of infographics speaks to the role the Internet and social media occupy in people's lives. Information — especially digital image files — flows freely between individuals via mobile devices and computers connected to the Internet through social media and email. An infographic can be shared with someone over a

mobile device in a few seconds with relative ease.

Infographics, however, are not limited to the presentation of quantitative data sets. And indeed, many modern infographics portray qualitative information. Some of the most compelling and attractive infographics are those that combine qualitative and the quantitative information into a rich and detailed story or narrative about a topic.

One method of using infographics to tell stories is through the creation of animated infographics, also known as motion graphics. Motion graphics use animation techniques to assist and enhance the portrayal of the data or concepts being presented. At their core, they are a synthesis of elements common to animation and traditional visual design. They also have the potential to fuse audio and visual stimuli more effectively than any other digital media (Kim, Kwon, Paik, and Sinykin 2003). Some of the most common software programs that are used to create motion graphics include Adobe After Effects, Maxon Cinema 4D, Flash, Autodesk Maya, and Autodesk 3ds Max. These programs are used in conjunction with other image editing programs such as Photoshop and Illustrator to produce both two-dimensional and three-dimensional animations of images and text. Using a system of layers that is common among graphic design and animation software, these animations can be combined with other animations and video into more detailed and intricate motion graphics. This process of taking separate animated or video elements and adding them all into one cohesive video or animation presentation is known as compositing.

We know that animation can help engage people in a learning environment (Harrison and Hummell 2010) and that animation can also help overall retention of information (Betrancourt, et al. 2009). It is reasonable to assume that animating an infographic would help the viewer comprehend and retain the information being presented, at least to some extent. Also, the ability

of motion graphics to present information in a narrative format is important in that a narrative presentation of information may help a viewer retain the information being presented. (http://www.holmesreport.com/news-info/14207/PRSummit-Want-To-Change-Minds-Narrative-Trumps-Facts.aspx) We have seen through the work of Tufte, Playfair, and Minard that simple narratives can be recognized and described through the simple display of information in a data graphic. Some of the same elements that make up static infographics also apply to motion graphics, with the exception of the crucial element to any motion graphic — animated action or movement. As Musselman points out, "Motion graphics take many forms, but to be considered a motion graphic these elements must incorporate movement or be in motion." (5)

The basic elements of a motion graphic are described in Musselman's thesis and consist of shape/form, typography, image, and live action. Quoting Gallagher and Paldy, Krasner, and Taylor, Mussleman defines them as follows:

> Shape/Form - "It goes without saying that there are the standard geometric shapes that we're all familiar with, such as circles, squares, rectangles, and triangles, as well as nonstandard, freeform shapes. The shapes of individual objects should obviously be considered when putting together your designs—not just the individual shape of a single object but also the shapes created by the groups of objects or even shapes that form parts of bigger objects." (Taylor 2011)
>
> Typography - "Type is one of the principle means of constructing messages in graphic design … Today, text is no longer limited to static, spatial forms of communication; it is also governed by time

and motion. These added dimensions further enhance its communicative power." (Krasner 2008) "Because typography is the main focus of the motion graphic that holds viewer's attention, the details of each letter must be considered." (Gallagher & Paldy 2007)

Image - "Images can take on many visual characteristics ranging from graphic to textural, sketchy, whimsical, realistic, abstract, or layered. (Krasner 2008) Musselman states that images can be used in motion graphics as main content, background imagery, or to add texture to other elements in a design such as shapes or typography.

Live Action - Musselman says, "Live-action content has had a stronger presence in motion graphics due in part to the growing cinematic vocabulary of designers and to technical advancements in digital compositing. Regardless of the space live-action occupies in the frame, it must work aesthetically with other graphic elements and it's qualities must contribute to the concept, message, or mood being communicated." (Krasner 2008)

Many motion graphics use traditional means of interpreting and displaying information such as various charts and graphs, but add animation to emphasize or show relationships between data. Christian Behrens' thesis (2008) on visualization design patterns describes the various groups of visualization (visual representations accompany this proposal as Appendix 3):

Correlations - Scatter plots, bubble diagrams

Continuous quantities - Simple line chart, multiset line chart,

stacked area chart, sparklines

Discrete quantities - Simple bar chart, multiset bar chart, dot matrix, stacked bar chart, isometric bar chart, span chart

Proportions - Simple pie chart, ring chart

Flows - Sankey diagram, thread arc

Hierarchies - Tree diagram, treemap

Networks - Tree diagram, relation circle, pearl necklace

Space - Topographic map, thematic map

So, what are the pros and cons, so to speak, of using a motion graphic to convey information? According to Fichtel, Finke, and Manger, there are seven strengths of motion graphics. (24) Motion graphics can:

1. show time sequences of events graphically and either slow or accelerate time in order to emphasize or speed up processes;
2. show causality by highlighting relationships between pieces of data and showing how processes work;
3. direct the viewer to select pieces of information in a predetermined sequence, making it easier for the viewer to understand the information;
4. show expressions and the way things move using animations;
5. combine varied techniques of depiction along a length of time;
6. show changing perspectives by using camera angles and presenting information from a different perspective;
7. incorporate language to better connect with the viewer and

sound effects to enhance the information being portrayed.

The authors also describe four weaknesses (25) of motion graphics:

1. there is a limited amount of time for the viewer to see and understand the content;
2. due to the linear nature of motion graphics and because of their limited time frame, a viewer is only shown a certain set of facts and nothing more;
3. when dealing with statistical data, it can be more difficult to show complexity in animated images that in static graphics, because of the limited time frame for viewing;
4. a viewer is unable to examine the information they are watching in depth and they cannot question what the motion graphic is trying to convey.

Theories concerning the psychology of perception also apply to motion graphics and those theories can be a guide in the creation of effective animations for those graphics. In *Informotion,* Fichtel, Finke, and Manger discuss how the theory of expectation and Gestalt theory, specifically, are relevant. The authors state, "the theory of expectation says that perception signifies the selection of the environment according to a pattern of expectations: people must be willing to perceive, otherwise they will not consciously perceive — that is, they do not direct their attention to the stimulus in question … In addition, knowledge can influence one's willingness to perceive and the act of perception itself. For example, certain phenomena that occur in the relevant spatial and temporal context are expected in advance but by perceptive cells that are not activated: When something is perceived, attracting attention, the gaze turns to it

and its contours are fed into the recognition of form." (103-4) According to Fichtel, Finke, and Manger, a designer should consider how to create expectation patterns and possibilities to direct a viewer's attention so that the proper design elements are chosen and utilized in the motion graphic. The authors reference the Gestalt theory of psychology (Koffka 1935, Kohler 1929, Wertheimer 1923) and how its fundamental principle — people perceive shapes and objects in their entirety before perceiving the individual parts that make up the whole (also known as a "Gestalt"). According to Fichtel, Finke, and Manger, "the organizing effect of Gestalt laws can help designers create exciting and lively representation. Often the eye feels magically attracted to depictions produced by observing certain Gestalt laws." The authors list the most important laws in *Informotion*:

> 1. The Law of Precision - When creating motion graphics with moving images, choose clear and unambiguous forms.
> 2. The Law of Good Gestalt - Images and forms should be easy to recognize and specific. They should be able to be perceived quickly while not leaving any room for interpretation as to what the image or form represents.
> 3. The Law of Symmetry - Symmetrical shapes and forms are perceived preferentially to asymmetrical forms and shapes when displayed together.
> 4. The Law of Proximity - The amount of space between objects can produce connections between shapes and forms.
> 5. The Law of "The Whole More Than Sum of Parts" - Shapes and forms can add up to produce figures and, in the context of motion

graphics, audio and voiceovers can also be perceived as part of a the whole and must coincide with established visual relationships in the content.

6. The Figure-Ground Principle - Separation of the foreground and background of an image must exist to ensure the comprehension of a shape or form. Objects can be set apart from their backgrounds by using color, shape, or movement.

7. The Law of Similarity - Similar objects are perceived as being connected.

8. The Law of Continuity - Objects that follow others based on time or spatial continuity, will be perceived as as grouped together. This law can also apply to the audio of a motion graphic.

9. The Law of Closure - When certain elements are lined up together, their shapes can give the impression of a larger, closed shape or form.

These laws provide a few simple guidelines for the creation of motion graphics and show, as the authors claim, the relevance of Gestalt theory to the medium.

The techniques for creating motion graphics are defined by Fichtel, Finke, and Manger as what they call the “means of implementation.” Those means are broken down into five main categories: narration, animation, voice over, sound, focusing the viewer’s attention.

The authors define narration as the spatial and temporal organization of a narrated plot in a sequence. “It is defined by a beginning an end or by an initial situation and the transformation of at least one feature that brings about a final situation.” This is what is known as “minimal

structure." In the realm of motion graphics, narration can mean both the visual means of advancing a story or sequence, or any voice overs or audio that serve the same purpose. Narration can be achieved through the use of various editing techniques. When shots are edited together, connections between the individual shots are created and continuity is established. Continuity is important as it guides the viewer, holds their attention, and establishes relationships between scenes, the authors argue. The authors, quoting Ware (2008), point out that when expectations created by continuity are fulfilled, it helps hold a viewer's attention and avoids confusing them. "If a car travels out of one side of the frame in once scene, it should arrive in the next scene traveling in the same direction (for example, from left to right); otherwise the audience may lose track of it and pay attention to something else," according to Ware (328). Ware describes these types of visual 'anchors,' claiming that "certain visual objects may act as visual reference points, or anchors, tying one view of a data space to the next. [...] When cuts are made from one view to another, ideally, several anchors should be visible from the previous frame." (328) Different types of editing can affect continuity, Fichtel, Finke, and Manger argue. Continuity editing, also known as Classical Narration, is intended to be as subtle as possible. It should cause the viewer to focus solely on the events taking place in the motion graphic. There should not be any quick switching between cuts or sudden cuts that would disturb the viewer. Long Take editing has no cuts between scenes and is usually used to depict processes and is well-suited to conveying information, according to the authors. Both the rhythm (the length of individual shots) and the tempo (the pace between shots) must be considered when editing motion graphics, as well as the camera angles used to establish a scene or point of interest.

Fichtel, Finke, and Manger define animation as moving images that change continuously over time . This continuous change can show representations of data in a temporal sequence.

“The animation makes it possible to visualize changes in content or space … In addition, animation offers the possibility of illustrating causal connections, thus revealing mutual dependencies between data, objects, and processes,” (155) they argue. There are two types of animation that the authors define, animations of color and animations of form. Color can be animated to show dominance among objects, to show contrast between objects, and to show the difference between reality and fantasy. Color can also be animated to assign meaning to certain objects, to group objects together, and to show changes in state (for example, a change in temperature could be shown by animating an object going from red to blue). Form is defined by Fichtel, Finke, and Manger as “any graphic construct, from the line to the three-dimensional volume.” (167) Animating forms can show quantities, differences in size, and causal relationships between individual forms or groups of forms. Animated forms can also be used to direct attention and realistically portray physical properties such as weight, speed, hardness, or temperature.

While text is often used to convey information in motion graphics, voice over can be useful in a motion graphic by helping to convey ideas and information on a second channel of perception other than the visual channel, Fichtel, Finke, and Manger claim. The authors, referencing Ware, stress that “voice overs should not simply be regarded as a way to make complex presentations more clearly but also as a way of anchoring information more enduringly.” (312) Information or processes can be labeled via voice over, but care should be taken to maximize the link between the voice over and the animated imagery being shown. When a visual event is being described by voice over, the voice over should occur at the same moment as the event. It can also be helpful to use arrows to point at images or events when a voice over is referring to them.

Sound can be used as a narrative element when paired with animation, Fichtel, Finke, and Manger claim. Using the example of a dramatic radio presentation, the authors point out how sounds can help set a scene. “If we hear the sound of typing on keyboards, our mind’s eye pictures an office or workplace. The sound component alone is enough to establish the setting of a whole scene.” (179) Sound is grouped into two categories in *Informotion*. Causal sounds have a cause and effect. For example, if a bumblebee is seen on screen, a buzzing noise is heard; if there is an explosion on screen, a loud bang is heard. Acousmatic sounds are sound where the source is not visible on screen. These sounds can be used to set a scene and form the basis of the sound effects for another animated image, the authors say.

Motion graphics portray information, so naturally they need to properly focus a viewer’s attention. Fichtel, Finke, and Manger note that “moving elements attract our eyes as if by magic, instinctively focusing our attention.” (184) The authors describe three general ways to attract attention. Using color, objects or points of interest can be made to blink, the color around an area can be softened, or the color of a single object within a group can be changed. Using form, an object can be scaled to emphasize importance, an object can be outlined to highlight it, or an object can be marked with another object or figure. The authors also describe ways to focus a viewer’s attention via camera angles. A zoom can narrow the perspective to focus on a single image or object, a tracking shot can focus on the movements of an object, or depth of field can be used to soften the area around an object to emphasize it.

Research Questions

Based on the research I have performed, I propose to study the visual styles, production methods, and artistic techniques used in the creation of linear, non-interactive motion graphics. In this study, I would use content analysis to examine how those styles, methods, and techniques

are used in a sample of 50 motion graphics gathered as a supplement to *Informotion* from various journalistic, academic, commercial, and philanthropic sources using a codesheet of my design that is inspired by *Videostyle* and *Informotion*. This is a descriptive study, so I will not be proposing a formal hypothesis, but I will be examining a fairly comprehensive sample.

I am interested in studying the different visual techniques and production methods used to create motion graphics because using motion graphics to convey information is a relatively new discipline. There has not been much academic work published on the techniques of creating effective motion graphics and the benefits of using certain techniques over others in their creation. There are also few reference books that deal specifically with the creation of motion graphics as animated infographics. As Skjulstad notes, "Motion graphics is a fast developing area in which the experimental and commercial and communicative practices of designers, like earlier parts of the web, are developed slightly ahead of detailed analysis." (360)

Many instead describe and teach techniques used in the television and film industries such as title sequences, marquees, text, and visual effects. However, there are definitive sources for expertise on the creation of effective data graphics. These experts have studied the history of the creation of data graphics and identified key figures in the development of the discipline. There are also modern experts in the fields of data visualization and other emerging scholars expanding our base of knowledge. Their work will inform my examination of motion graphics. Others have studied the effect that animation has on learning. To some extent, their work will also inform my study.

Methodology

For the purposes of this study, I will use content analysis to examine the motion graphics in my sample. Content analysis is a technique used to extract desired information from a body of

material (usually verbal) by systematically and objectively identifying specified characteristics. (Smith 2002, quoting Berelson 1954; Holsti 1969; Stone, et al. 1966)

The sample for this study is a series of 50 motion graphics that are collected as a supplement to the reference book *Informotion* (Fichtel, Finke, and Manger 2012) and from other sources related to journalism, business, education, and social advocacy. They have been chosen not only for their convenience as an existing group of collected work, but also for their diversity of subject matter and intention. The authors of *Informotion* do not divulge their reasons for choosing the specific motion graphics they provide, other than to say they wanted to "show the diversity of possible visualizations in animated explanatory films and which aspects should be considered when communicating specific information in a moving image." (12)

I would code the motion graphics in my sample using *Motionography,* the codesheet I have designed for the purposes of this study and that is based off of the work of previous scholars and experts in the fields of motion graphics, data visualization, and graphic design. *Motionography* takes cues from *Videostyle* (Johnston and Kaid 2001), *Informotion* (Fichtel, Finke, and Manger 2012), and *Effect of Ornamentation on the Emotional Response and Perception of Motion Graphics* (Musselman 2013). In general, the codesheet will look for characteristics in the motion graphics related to narration, editing, camera angles, color schemes, animated colors, shapes, animated shapes, points in time, causal relationships, sound editing, soundtracks, causal sounds, and focusing a viewer's attention using various techniques. The coding of the sample should take no more than three months. The *Motionography* codesheet is included with this proposal as Appendix 1.

I would also conduct interviews with the producers of the motion graphics in the sample. I would ask them questions about their background, education, and any intentions or motivations

behind the motion graphics they helped create. The interview questions are included with this proposal as Appendix 2.

I would also draw a sample of 20 undergraduate students to look at a smaller sub-sample of 10 motion graphics from the larger sample of 50 and use Eye-Tracking to track where their eyes look as they watch those graphics. I would advertise for the research opportunity in the Daily Tar Heel campus newspaper and put up flyers around Carroll Hall and the Student Union to advertise as well. The sample would be half male and half female. Each participant would sign a consent form before being allowed to participate in the study. Each study participant would watch each motion graphic video by themselves in a room on a computer screen with the eye-tracking device mounted to it. Eye tracking data would be collected while each participant watched each motion graphic.

Through this research, I hope to determine how some of the production techniques used by the producers of the motion graphics attract attention to certain elements and what artistic or design techniques are used to attract that attention. This study will help increase understanding about how effective motion graphics are created and what techniques are more effective than others at capturing a viewer's attention. This knowledge gained from this study could be applied to the design of motion graphics for a number of purposes including advertising and marketing, social or political advocacy, or education. This study will also help to clarify what elements in motion graphics are superfluous and unnecessary in order to further refine the practice of targeting clear and concise information delivery through the design of motion graphics.

Appendix 1 - *Motionography* codesheet

Coder name: _____

Motion Graphic title: _____

1. Length of motion graphic:
a. Two to five minutes
b. 20-30 seconds
c. 60 seconds
d. Other (specify) _____

2. What perspective is this motion graphic presented in?
a. Two dimensions
b. Three dimensions

3. Who create the motion graphic?
a. Freelance artist
b. Company (internally produced)
c. Advertising/Marketing/Public Relations firm
d. Student
e. Non-profit group - religious
f. Non-profit group - political
g. Non-profit group - educational

4. How much animation and video are present?
a. All animation
b. Mostly animation
c. Half animation, half video
d. Mostly video
e. All video, some animated graphics
f. All video, no animated graphics

5. What pixel aspect ration is the motion graphic presented in?
a. 4:3 1.33:1
b. 4:3 1.66:1
c. 4:3 1.85:1
d. 4:3 2.35:1
e. 16:9 1.78:1
f. 16:9 1.37:1
g. 16:9 1.66:1
h. 16:9 1.85:1
i. 16:9 2.35:1

6. Does the motion graphic conform to proper title safe principles by always staying within the title safe area for that graphic's particular aspect ratio for the duration of the motion graphic?
a. Yes
b. No

7. Does the motion graphic conform to proper action safe principles by always staying within the action safe area for that graphic's particular aspect ratio for the duration of the motion graphic?
a. Yes
b. No

8. Is there sound?
a. Yes
b. No

9. Is there music?
a. Yes
b. No

10. If there is music present, what kind of music?
a. classical
b. modern (pop, rock, jazz)
c instrumental (background but not classical or modern)
d. marching music
e. trumpet or announcing music
f. folk/country/western
g. punk
h. metal
i. hip-hop
j. soul

11. Are there sound effects?
a. Yes
b. No

12. Are there causal sounds in the motion graphic?
a. Yes
b. No

13. Are there acousmatic sounds in the motion graphic?
a. Yes
b. No

14. Is there a voice over narrator?
a. Yes
b. No

15. If you answered 'Yes' for question 14, is the narrator a male or female voice?
a. Male
b. Female

16. What is the relationship between the text and any sound, music, or narration?
a. More text than music
b. More music than text
c. Even balance between text and music

17. Does the motion graphic speak directly to the viewer?
a. Yes
b. No

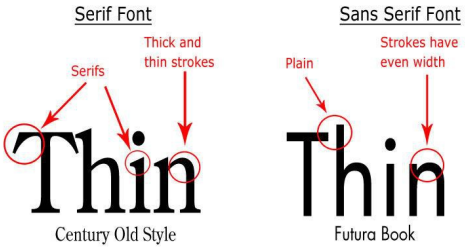
18. What kind of camera angles are used?
a. view from below
b. normal
c. view from above

19. How you would you describe the rhythm of this motion graphic?
a. Individual shots were all long in duration
b. Individual shots were all short in duration
c. Even mix of long duration and short duration shots

20. Is there color?
a. yes - there are more than just black, white, and grayscale colors
b. no - there are only black, white and grayscale colors

21. If there are colors, how would you describe the color palette?
a. Warm - reds, oranges, yellows
b. Cool - blues, greens, purples
c. An even mix of both warm and cool

22. Is there text of any kind in the motion graphic?
a. Yes
b. No



23. What kinds of typography are used?
a. Serif typefaces
b. Sans-serif typefaces

24. Is there static, non-animated background imagery for this motion graphic?
a. Yes
b. No

25. If 'Yes' to number 24, what is the background imagery?
a. Solid color
b. Solid color with one or more repetitive patterns

c. Solid color with one or more abstract, non-repetitive patterns
d. A photograph, color, unstylized
e. A photograph, black and white, unstylized
f. A photograph, color, stylized
g. A photograph, black and white, stylized

26. If 'No' to number 24, what is the background imagery?
a. Video sequence
b. Animated image sequence

27. Does the motion graphic feature any ornamentation, that is, animations that do not contribute any information or context to the motion graphic, but serve merely as decoration?
a. Yes
b. No

28. Are there information graphics displayed in the motion graphic?
a. Yes
b. No

29. If Yes to number 28, what kinds of information graphics are displayed?
a. Correlations
b. Continuous quantities
c. Discrete quantities
d. Proportions
e. Flows
f. Hierarchies
g. Networks
h. Space

30. What methods were used to focus the viewer's attention via color?
a. Blinking
b. Softening
c. Coloring

31. What methods were used to focus the viewer's attention via form?
a. Scaling
b. Outlining
c. Marking

32. What methods were used to focus the viewer's attention via camera angles or perspective?
a. Zoom
b. Tracking
c. Depth of Field

33. Was sound used to focus the viewer's attention on any single object or event at any point during the motion graphic?
a. Yes
b. No

34. Was a voiceover used to focus the viewer's attention on any single object or event at any point during the motion graphic?
a. Yes
b. No

Appendix 2 - Interview Questions for motion graphics producers

1. What is your name? What is your age? Where did you go to college?

2. What is your job title?

3. What company do you work for?

4. Who was the client that this motion graphic designed for?

5. What was the stated purpose for creating this motion graphic?

6. What would you say the overall theme of this motion graphic is?

7. How long did it take from start to finish to create this motion graphic? How many others worked on it and in what capacity?

8. What are some of the strengths of using a motion graphic to portray this subject matter as

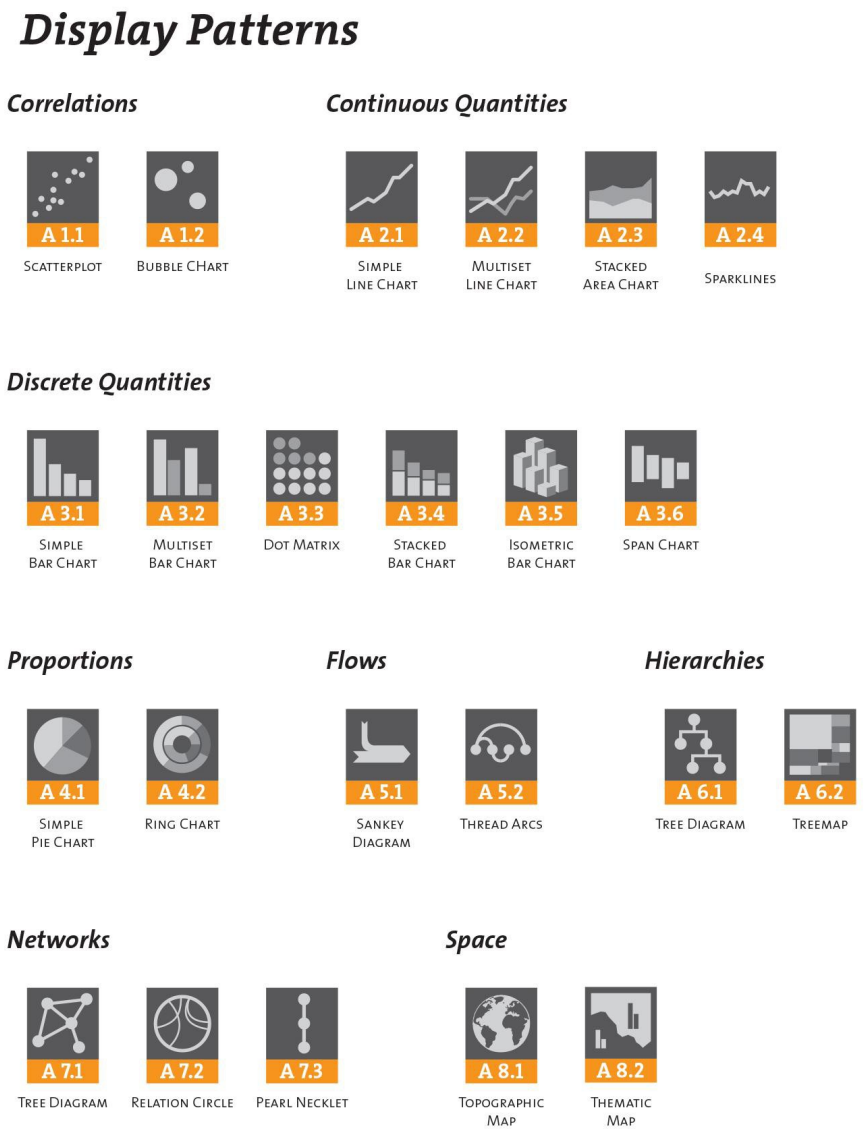
opposed to just using live action video or still images?

9. How would you describe the visual or aesthetic style of this motion graphic?

10. What would you say is the tone of this motion graphic?

11. What kind of causal relationships did you have to portray in this motion graphic

Appendix 3



Visualizations from Christian Behrens' "The Form of Facts and Figures: Design Patterns for Interactive Information Visualization" (2008)

Appendix IV

Consent Form for Eye-tracking Study Participation

Thank you for agreeing to participate in this study of motion graphics! The research will be conducted by graduate student Grayson Mendenhall currently enrolled at the University of North Carolina in the School of Journalism and Mass Communication. It will require around four hours of your time.

Purpose: This study will examine a series of animated, linear, and non-interactive motion graphics using Eye-tracking technology. Eye-tracking uses a device that measures your eye position and eye movement and can be used to determine where a person is looking on a computer screen. This study will use the technology to determine where the participants look when viewing the motion graphics being studied.

Potential risks: There should not be any specific risks associated with participating in this study. There is a fairly significant time commitment, so it is important to be aware of the fact that it will require around four hours of time for each participant. Because you will be watching animated infographics on a computer screen for a significant amount of time, there will be a 15-minute break after every hour of viewing to mitigate eye fatigue.

Results and privacy: The results of this study will only be shared with other professors and other students associated with this research study. You may choose to have your data kept secret or made anonymous in the event of conference presentation or publication of the study results. Great care will be taken to secure any and all data gathered in relation to this study, including any physical or digital records of your participation. Rooms holding any of those physical files will be locked when not in use and computer servers, clouds, and hard drives holding any digital information will be password-protected.

For more information: This study is being conducted by University of North Carolina graduate student Grayson Mendenhall and is being overseen by UNC professor Daniel Kreiss. Please ask any questions you have before you agree to participate in the study. If you have any questions after the conclusion of the study, you may contact Grayson Mendenhall at gkm4unc@email.unc.edu or 919-724-0911. For information about your rights as a subject in this study, you may contact the Institutional Review Board of the University of North Carolina. You may request a copy of this form for your records upon signing.

Consent Agreement: I have read the above information, and have received answers to any questions I asked. I consent to take part in the study.

Your Name (first and last, printed):_____

Your Signature: _____

Today's date: _____

This form will be kept on record by the graduate student in charge of this study for at least three years beyond the end of the study. This study was approved by the Institutional Review Board on (date of approval) _____.

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